



Air Quality & Health Showcase

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Air Pollution and Health in Latin America and the Caribbean: An Overview

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MAJOR DRIVING FORCES



- Around 643 million inhabitants (2016) in the LAC region
 - 8.6% of World Population
- LAC is the most urbanized region in the world
 - 8/10 people living in cities
 - ~35% of urban population concentrated in 30 major metropolitan areas
- The region generates 7% of Gross World Product (PPP)
- An unequal region: the richest 1% owns 41% of the region's total wealth
- Energy consumption is expected to grow in the region around 50% by 2040 compared to 2012
- High rate of rural population exposed to emissions from wood cook stoves
- Public transport has still a dominant mode share in transport supply
- However, LAC has the largest motorization rate in the world
 - It has five times as many cars as sub-Saharan Africa or Asia, and about twice as many as the Middle East or North Africa.
- Major forces driving motorization in the region:
 - Rising incomes
 - Expanding middle classes
 - An expanding local automobile industry,
 - Availability of low-cost vehicles
 - Poor land use and transport planning and oriented to car use
 - Insufficient sustainable mobility options.

PRESSURE: BLACK CARBON, HIGHLIGHTING AIR POLLUTION URBAN AND RURAL CHALLENGES

UNEP/ICAC

FIGURE 2
Sectoral and regional contribution to BC emissions in the LAC region in 2010.
NOTE
1 gigagram (Gg) = 1 000 tonnes (kt)



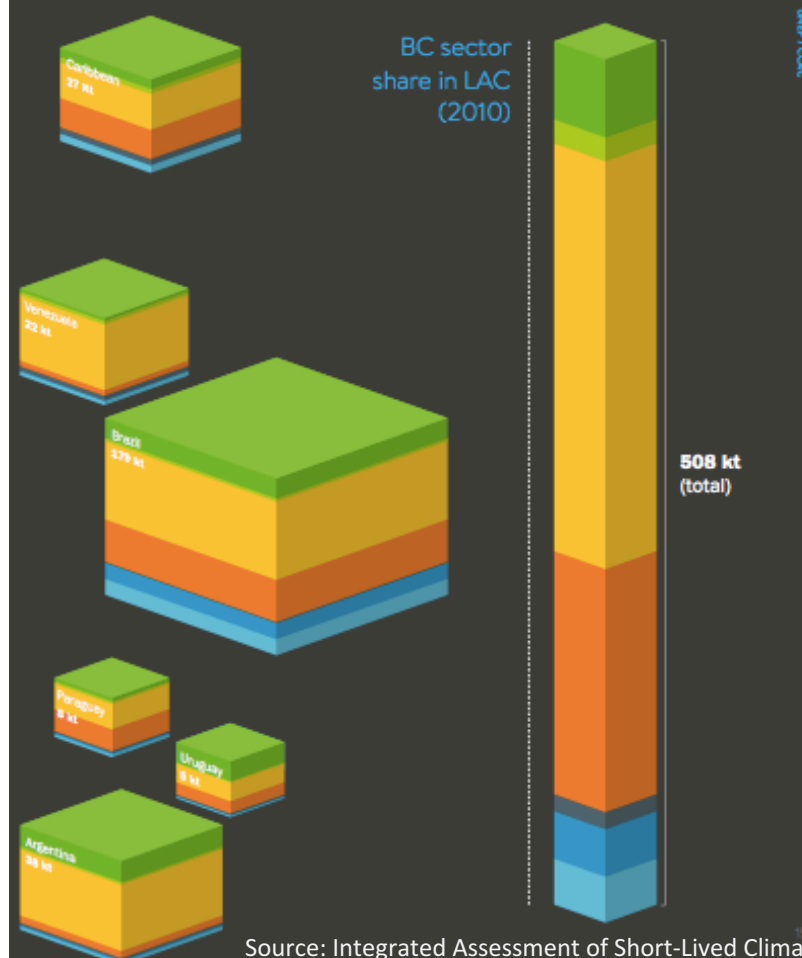
- Agriculture
- Waste
- Transport
- Residential
- Coal, oil and gas
- Industry
- Power plants

Black carbon

The LAC region emits about 508 Gg of BC (baseline 2010) per year, and is responsible for less than 10 per cent of total global anthropogenic emissions of BC, excluding those from forest and savannah fires. More than 60 per cent of the region's emissions originate in Brazil and Mexico. Two major source sectors emit about three quarters of BC emissions in LAC: transport and the residential combustion of solid fuels (Figure 2). Nationally, the transport sector makes up the largest portion of BC emissions in most countries, other than in Chile, Paraguay and the countries of Central America where residential combustion contributes a higher proportion. The agricultural sector is a significant source in a number of countries including Uruguay, approximately 35 per cent; Argentina, approximately 20 per cent; and Colombia, approximately

15 per cent. The industrial sector, including brick manufacture, is also an important source of BC emissions in several countries, contributing up to 10 per cent of total BC emissions in Brazil, Ecuador and Mexico.

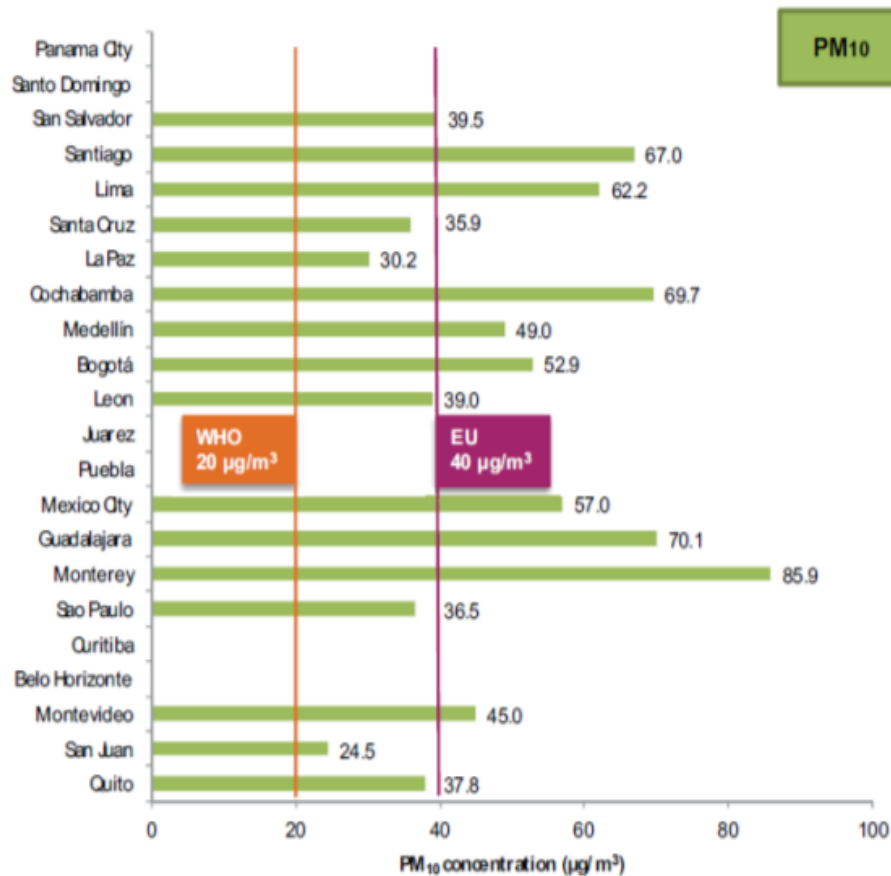
Open biomass burning is widespread in LAC; in certain regions it stems from ancestral agricultural practices and in others, from the advancing agricultural frontiers over primarily tropical and subtropical forests, and savannahs. Forest fires are the largest source of BC in South America, but the net impact of all emissions from this source is near-term cooling due to the high emission of OC. It is, therefore, not considered part of an SLOP strategy.



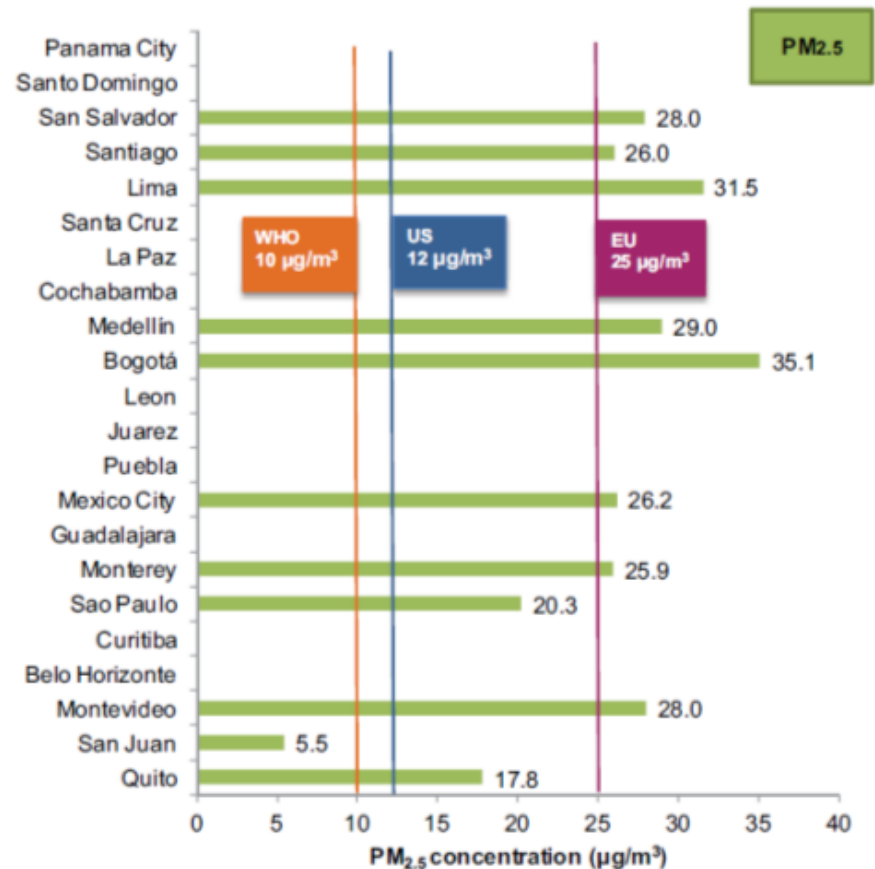
Source: Integrated Assessment of Short-Lived Climate Pollutants in Latin America and the Caribbean. 2016

STATE OF AIR QUALITY IN LAC: A REGIONAL OVERVIEW

Annual average concentrations for PM₁₀. 2011.



Annual average concentrations for PM_{2.5} 2011.

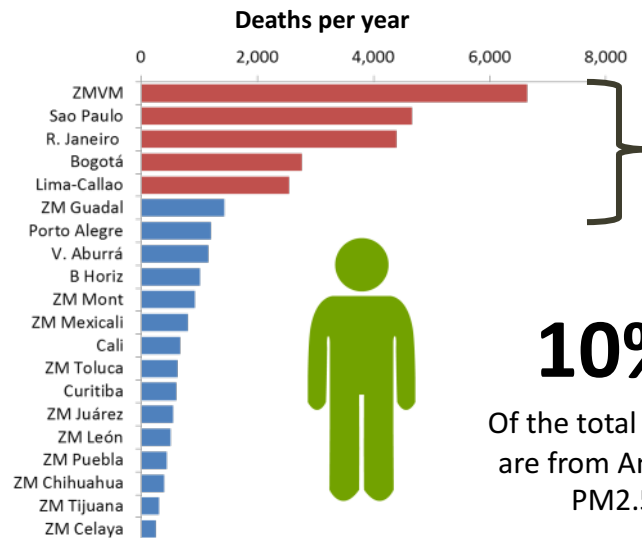


Source: Clean Air Institute (2013)

IMPACTS: OVERVIEW OF AMBIENT AIR POLLUTION EFFECTS IN LAC

**~100
thousand**

Total Deaths per year
from Ambient PM2.5
in LAC



**21 thousand
per year**

Total Deaths in MCMX, Sao Paulo,
Rio de Janeiro, Bogotá, Lima-Callao

10%

Of the total deaths
are from Ambient
PM2.5

150 million

People living in LAC
cities exceeding WHO
PM2.5 Guidelines

Other Externalities



Respiratory
Illness, COPD
and Lung
Cancer



Cardiovascular
Diseases



Traffic
Congestion
Increased Costs



Increased
Logistic Costs



Productivity
Losses

+ 2.0%

Average welfare losses as a
percentage of the GDP in LAC Cities
due to ambient PM2.5

Plus other Externalities

RESPONSES FROM LAC TO LOCAL, REGIONAL AND GLOBAL AIR POLLUTION



- Successful Air Quality Management Plans implemented in the region so far (Mexico City, Santiago, Sao Paulo and Bogotá, among others).
- Major metropolitan regions are currently reinforcing their air quality management programs in Mexico, Colombia and Peru, among others.
- Regional Action Plan on Air Pollution adopted by the Forum of Ministers of Environment of Latin American and the Caribbean in 2014 and ratified in 2016
- Region wide research (SLCP LAC Assessment, ESCALA study, Air Quality Overview, etc.)
- Some National Determined Commitments explicitly include SLCP (for example Mexico)
- Latin American Cities are joining the WHO-CCAC's Breathe Life Initiative.

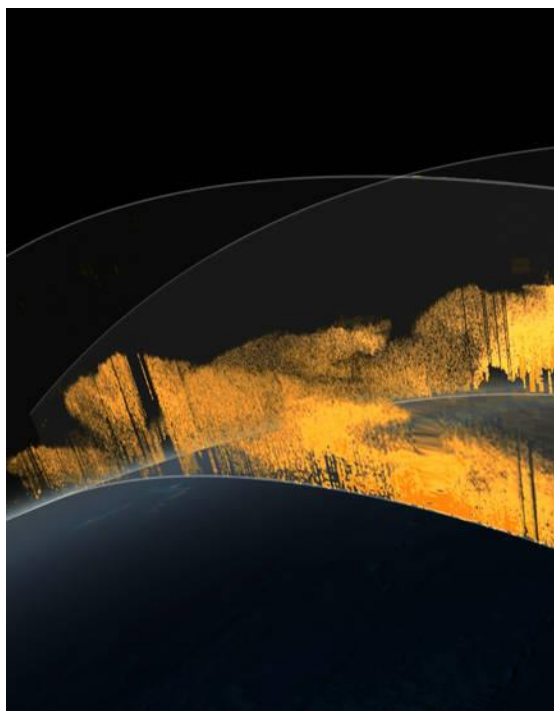
NASA IS PLAYING A ROLE TO UNDERSTAND LOCAL, REGIONAL AND GLOBAL AIR POLLUTION AND HEALTH PHENOMENA AND ABATEMENT ACTIONS

Strengthen of Air Quality Management Systems



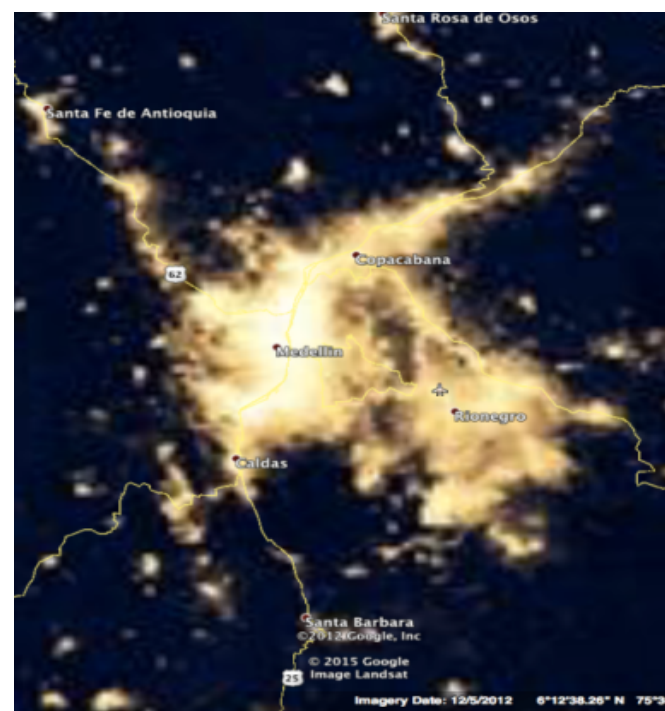
Fires in México's Yucatan Province (NASA)

Comprehension of Regional Phenomena



NASA Saharan Dust Transport Simulations

Supporting Education and Awareness Programs



Night View. Metropolitan Area of the Aburra's Valley (Colombia), Google

OPPORTUNITIES AND CHALLENGES TO LINK SATELLITE MONITORING WITH ATMOSPHERIC MONITORING (LAC)

- Investment in robust real-time on the ground monitoring needs to be made alongside investment in developing satellite data capabilities.
- Short term opportunities exist in major LAC capitals (Mexico City, Sao Paulo, Santiago, Medellin) with more advanced monitoring networks. Focus in those cities would allow to demonstrate application in LAC.

Key opportunities for LAC

- Extend spatial coverage of existing PM_{2.5} monitoring.
- Protect public health in areas without monitors.
- Improved forecasting capabilities.
- Better characterization of air quality nationally and regionally

Requirements for robust satellite-based data and

- Ground truthing with real-time monitors.
- Understanding of regional relationship between the real-time monitoring and satellite data to adapt the US model.
- Tools and skills for data presentation and correct usage/ interpretation.

Fundamental Challenges

- Real-time data monitoring of questionable quality across the region making ground truthing difficult.
- Funding required for adaption of the USEPA model but \$\$ scarce for implementing and maintaining real-time monitoring.
- Potential skills gap for utilizing the outputs of such a data resource.

CONCLUSIONS



- Since LAC is the most urbanized region of the world, its population is highly vulnerable to air pollution impacts. However, it also frames the opportunity to implement highly efficient actions.
- Transport and residential combustion of solid fuels are responsible of 75% of the BC emissions in the region. Those emissions represent an increased risk in population exposure to air pollution.
- Some immediate opportunities for collaboration with NASA to improve understanding of air pollution and health impacts there exist in major LAC capital cities where more advanced monitoring networks are in operation. Focus in those cities would allow to validate and demonstrate application in LAC and explore opportunities and need to cover larger areas and/or support air quality modeling systems.
- Suggested collaboration opportunities:
 - Develop pilot/demonstration projects focused on selected cities with robust monitoring and demonstrated commitment to air quality improvement (e.g. Mexico City and Medellin)
 - Assess the ability for the existing AIRNow Satellite Data Processor to provide accurate estimates of ground level concentrations in the selected areas and estimate requirements for amending the Data Processor to fit LAC conditions.
 - Undertake analysis to assess the value to stakeholders, as well as potential uses of satellite enhanced data across the region, including air quality forecasts and episode identification and follow.
 - Identify monitoring networks across LAC that are sufficiently robust to support the use of the Satellite Data processor.



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